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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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08/788,560 01/24/97 YAMAZAKI

S 0756-1626

EXAMINER

MM22/0216

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NAT. INV. I
ART UNIT

PAPER NUMBER

2811
DATE MAILED:

02/16/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

08/788,560

Applicant(s)

Yamazaki et al.

Examiner

ORI NADAV

Group Art Unit

2811



☒ Responsive to communication(s) filed on Jan 18, 2000

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 78-157 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 78-157 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

Art Unit: 2811

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 82, 88, 94, 100, 108, 116, 124 and 132 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The structural limitation of a threshold voltage of an NMOS being approximately equivalent to that of the PMOS is unclear, because the respective values of the threshold voltages are positive and negative, thus rendering them unequal. The absolute values of the threshold voltages can be approximately equal.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2811

4. Claims 78-81, 83-87, 89-93, 95-99, 101-103, 105-107, 109-111, 113-115, 117-119, 121-123, 125-127, 129-131 and 133 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson et al. (4,755,865) in view of Saito et al. (4,772,927).

Wilson et al. teaches in figure 3 substantially the entire claimed structure, including a MOS transistor comprising a semiconductor layer 42 comprising a channel region 42B in between source and drain regions 42A, a gate electrode 44 adjacent the channel region with gate insulating film 43 interposed therebetween, wherein each of the source and drain regions has a portion 42C containing one or more elements selected from a group consisting of carbon, nitrogen and oxygen at a concentration higher than $10E15$ atoms per cm cube or more (column 4, lines 39-49), wherein the channel region containing boron (column 6, lines 31-32).

Wilson et al. do not explicitly disclose a channel region containing impurities at a concentration of from $10E15$ to $5X10E17$ atoms per cm cube. However, Wilson et al. teach diffusing impurities at concentration of from $10E15$ to $5X10E17$ atoms per cm cube (column 6, lines 36-37), and under certain processing conditions the channel region can have similar concentration (column 6, lines 64-66). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a channel region containing impurities at a concentration of from $10E15$ to $5X10E17$ atoms per cm in Wilson et al.'s device, since adjusting the amount of impurity concentration in a semiconductor device is a matter of design choice within the skills of an artisan, subject to routine experimentation and optimization.

Wilson et al. do not teach a MOS transistor used in a CMOS device.

Art Unit: 2811

Saito et al. teach a MOS transistor in figure 1e comprising a semiconductor layer comprising a channel region 7 in between source and drain regions 6, a gate electrode 9 adjacent the channel region with gate insulating film 5 interposed therebetween, wherein the source and drain regions have at least one portion containing one or more elements selected from a group consisting of carbon, nitrogen and oxygen at a concentration higher than 10^{19} atoms per cm cube or more (column 3, line 49 to column 4, line 24), formed in a CMOS device (figure 2).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use Wilson et al.'s transistor in a CMOS device, because it is conventional in the art to connect individual transistors in order to form a CMOS device. The combination is motivated by the teachings of Saito et al. who point out the advantages of using a TFT transistor having source and drain regions containing carbon, nitrogen or oxygen at a concentration higher than 10^{19} atoms per cm cube or more in a CMOS device.

Regarding claims 102, 110, 118 and 126, Saito et al. teach a channel region having at least one portion containing one or more elements selected from a group consisting of carbon, nitrogen and oxygen at a concentration higher than 10^{19} atoms per cm cube or more (column 5, lines 20-23).

5. Claims 82, 88, 94, 100, 108, 116, 124 and 132, insofar as in compliance with 35 U.S.C. 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson et al. and Saito et al., as applied above, and further in view of Solheim (5,219,784).

Art Unit: 2811

Wilson et al. and Saito et al. teach substantially the entire claimed structure, as above, except a threshold voltage of an NMOS being approximately equivalent to that of the PMOS.

Solheim teaches a threshold voltage of an NMOS being approximately equivalent to that of the PMOS (column 4, lines 45-55).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use of a threshold voltage of an NMOS being approximately equivalent to that of the PMOS in Wilson et al.'s device, since adjusting the threshold voltage is a matter of design choice within the skills of an artisan, subject to routine experimentation and optimization, depending on the intended use of the device.

6. Claims 104, 112, 120, 128 and 134-157 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson et al. and Saito et al., as applied to claims 102, 110, 118, 126 above, and further in view of Higashi et al. (4,694,317).

Wilson et al. and Saito et al. teach substantially the entire claimed structure, including a first interlayer insulating film (ILD) 10 (Saito et al.) comprising inorganic material, and a gate electrode comprising a silicon film containing phosphorus (Wilson et al., column 3, lines 38-40, and column 6, line 32). Wilson et al. and Saito et al. do not teach a second ILD film comprising organic resin and a pixel electrode on the second ILD film formed in a transparent or a reflective device.

Art Unit: 2811

Higashi et al. teach in figure 1D a transparent or a reflective device comprising a first interlayer insulating film 5 comprising inorganic material, a second ILD film 7 comprising organic resin and a pixel electrode 11 on the second ILD film (column 3, line 64 to column 4, line 48).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a second ILD film comprising organic resin under a pixel electrode in Wilson et al.'s device, in order to provide better protection for the device. The combination is motivated by the teachings of Higashi et al. who point out the advantages of using an organic ILD film under a pixel electrode in a TFT transistor.

Response to Arguments

7. Applicant argues on page 10 that prior art does not suggest a channel region containing impurities at a concentration of from $10E15$ to $5X10E17$ atoms per cm cube, and in order to establish a prima facie case of obviousness prior art must teach or suggest all the claim limitations. However, Wilson et al. teach a channel region containing boron (column 6, lines 31-32), and diffusing impurities at a concentration of from $10E15$ to $5X10E17$ atoms per cm cube (column 6, lines 36-37). Wilson et al. further teaches that under certain processing conditions the channel region can have similar concentration (column 6, lines 64-66). Therefore, Wilson et al. do suggest a channel region containing impurities at a concentration of from $10E15$ to $5X10E17$ atoms per cm.

Art Unit: 2811

Furthermore, as the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention, teaching, suggestion, or motivation to do so can be found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it is conventional and well within the skills of an artisan to apply the required impurity concentration to the device, depending on the optimum workable conditions of the application in hand.

Moreover, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). See also *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969), *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989), and *In re Kulling*, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990).

Conclusion

Art Unit: 2811

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

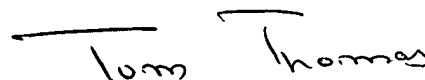
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

Art Unit: 2811

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to *Examiner Nadav* whose telephone number is **(703) 308-8138**. The Examiner is in the Office generally between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **308-0956**

A handwritten signature in black ink that reads "Tom Thomas". The signature is written in a cursive style with a horizontal line above the first name.

Tom Thomas
Supervisory Patent Examiner
Technology Center

Ori Nadav, Ph.D.

February 11, 2000